



## Response of growth and yield of two cultivars of corn (*Zea mays* L.) to spraying with a chlorophyll bio stimulator (Disper chlorophyll GS)

Rayan Fadhel Ahmed<sup>1</sup>

Khaleel Ibrahim Khaleel Al Kikani<sup>2</sup>

Fathi Abdulkareem Omar<sup>3</sup>

[rayanobody79@uomosul.edu.iq](mailto:rayanobody79@uomosul.edu.iq)

[khaleelibk@uomosul.edu.iq](mailto:khaleelibk@uomosul.edu.iq)

[fathiemenky@uod.ac](mailto:fathiemenky@uod.ac)

<sup>1,2</sup> Department of Field Crops, College of Agriculture and Forestry, University of Mosul, Mosul, Iraq

<sup>3</sup> Department of Field Crops, College of Agriculture Engineering Sciences, University of Duhok, Iraq

- Date of research received 15/09/2023 and accepted 03/10/2023.

### Abstract

The experiment was conducted at two sites (Zakho and Sumel) belonging to Dohuk Governorate / Iraq, on 18 to 21 July 2022, using (R.C.B.D) design with 3 replicates, to study the response of two cultivars of corn (Furat and Dejlá) to four levels of bio stimulant Disper Chlorophyll GS (0, 1 and 1.5 and 2g/L). The results revealed significant effect of Furat cultivar compared to Dejlá in both sites in all studied traits except plant leaves number. As for the bio stimulant chlorophyll, it has been recorded the level of 2 g/L the highest values of the studied traits in the two sites compared to the rest of the levels. The interaction was significant for all traits in the two sites, where Furat cultivar with the level of 2 g/L of bio stimulant achieved the highest grain yield (9.76 and 10.22 tons/ha) in both sites, respectively.

**Key words:** Corn, Bio, Stimulant, Chlorophyll, Cultivars.

**Citation:** Ahmed, R., Al Kikani, K., & Omar, F. (2023). Response of growth and yield of two cultivars of corn (*Zea mays* L.) to spraying with a chlorophyll bio stimulator (Disper chlorophyll GS). *Kirkuk University Journal For Agricultural Sciences*, 14 (4), 20-27. doi: 10.58928/ku23.14402.

**Corresponding author:** Rayan Fadhel Ahmed \_ [rayanobody79@uomosul.edu.iq](mailto:rayanobody79@uomosul.edu.iq)

**Copyright:** This is an open access article distributed under the terms of the creative common's attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited.

### Introduction

Corn is a major cereal crop and strategic over the world, and it comes after wheat and rice in terms of importance. Corn is grown on a

larger scale, the cultivated area in Iraq amounted to (515000) dunam with a production rate of (474000) ton, while the global cultivated

area is (193.7) million hectares with a production rate of (11147.6) million tons [1].

It is also a strenuous crop for the soil and its need for fertilizer is great, being one of the C4 plants that respond greatly to fertilizers, as biofertilizers are natural, environmentally friendly materials that contains beneficial organisms for the plant that provide the plant with important nutrients and growth regulators such as IAA and GA as well as chelating compounds it also maintains soil health and sustainability and reduces costs and negative effects resulting from excessive use of chemical fertilizers [2], thus providing healthy food and a partial or total alternative over time to chemical fertilizers. [3] indicated that there was a significant increase in the weight of 1000 grains, number of ear grains and the grain yield when increasing biofertilizer from 0 to 250 and 500 g/feddan, [4] noted the significant variation between four treats of biofertilizer in weight of 100 grains and grain yield, while no significant variation was observed in the chlorophyll content in the leaves.

Cultivars suitable for a region must also be selected so that they utilize the main growth sources well, which is ultimately reflected in the growth and productivity of the plant, [5] noted that Furat cultivar was significantly superior to Dejla cultivar in number of ear grains and grain yield, [6] indicated that Furat was significantly superior in grain yield.

### Materials and methods

Experiment was conducted in two sites (Zakho and Sumel) belong to Dohuk Governorate / Iraq during autumn season of 2022 to study corn cultivars (Furat and Dejla) with fertilization with four levels of the bio

stimulant Disper Chlorophyll GS fertilizer (0 control treatment, 1, 1.5 and 2 g/L). The plants were planted at the Zakho site on 18/7 and the Sumel site on 21/7, the weeds were manually controlled three times and the plants were watered as needed. The plants were treated with bio-fertilizer by spraying it twice on the vegetative growths until complete wetness. 1<sup>st</sup> spray was 30 days after sowing and 2<sup>nd</sup> was 10 days after the 1<sup>st</sup> spray, based on the information on the fertilizer label by the company.

The experimental unit contained 4 rows, 3 m long, the distance 75cm between each fence, the distance of 25cm between plants in the same row. Plants were harvested at 5/11 at the Zakho site and at 6/11 at the Sumel site, Traits were studied on 10 randomly selected plants from the two rows located in the middle. These traits were chlorophyll content index (spad), plant height (cm), leaves number, leaf area (cm<sup>2</sup>), ear weight (g), weight of 500 grains (g), number of ear grains, as well as grain yield (ton/ha).

Some soil characteristics of the two experimental sites were analyzed before planting (Table 1), and temperature and relative humidity data were obtained from Dohuk weather station/ Iraq (Table 2).

**Disper chlorophyll GS:** The high content of DISPER Chlorophyll with selected free amino acids (60%), vitamins (22%) and Molybdenum (2%) stimulates.

**Statistical analysis:** The R.C.B.D design was applied and data analyzed using SAS, and Duncan's tests at a 5% probability level were used to compare the averages of the treatments included in the experiment.

Table (1): soil characteristics for the two sites (Zakho and Sumel) in 2022.

	Clay (g/kg)	Silt (g/kg)	Sand (g/kg)	Textural	Available N (mg/kg)	Availabl e p (mg/kg)	Availabl e K (mg/kg)	organic matter (g/kg)	pH	EC (dc/ m)
Zakho	45.20	20.28	34.52	mixture	17.12	18.01	182.78	5.03	7.99	0.02
Sumel	57.61	29.39	13.00	clay	15.36	17.44	165.44	1.97	7.83	0.02

- Soil testing laboratories at college of agriculture engineering sciences, University of Duhok

Table (2): Temperature (C°) for the year 2022 in the two sites (Zakho and Sumel).

Month		Jul.	Aug.	Sep.	Oct.	Nov.
Zakho	Temp. (c°) (Maximum)	41.33	42.23	37.42	30.77	21.17
	Temp. (c°) (Minimum)	26.27	26.16	22.73	17.32	10.52
Sumel	Temp. (c°) (Maximum)	42.39	43.06	38.71	32.16	22.17
	Temp. (c°) (Minimum)	26.52	26.71	22.73	18.58	11.93

- Dohuk weather station at college of agriculture engineering sciences, University of Duhok.

## Results and discussion

### Chlorophyll Content Index (spad) (CCI):

Table (3) shows the significant superiority of Furat cultivar in (CCI) amounted to (44.88 and 50.88) compared to Dejla cultivar, which amounted to (41.35 and 48.22) in the two sites, respectively. This may be due to the genetic differences of the cultivars and their ability to exploit soil nutrients. This is consistent with [7] who noticed significant differences between the cultivars. A significant increase was observed in (CCI) when applying 2 g/L of bio stimulant, reaching (45.53 and 52.96) compared to the cont. treatment that achieved the lowest (CCI) (40.11 and 46.35) in the two sites, respectively and perhaps the reason is due to the increase in (CCI) at higher levels of fertilizer, to the positive effect of bio stimulant in the formation of chlorophyll pigment and keep the leaves green for the longest period. This is consistent with [8] who found a significant difference between bio fertilizers.

Table (4) shows the superiority of the interaction of Furat cultivar with the bio stimulant treatment of 2 g/L in (CCI) reaching (47.62 and 53.76) compared to the interaction of the Dejla cultivar with the cont. treat, which gave the lowest (CCI) reaching (38.36 and 44.93) in the two sites, respectively.

### Plant Height (cm) (PH):

Table (3) shows that Furat cultivar had a significant superiority in (PH) which reached (232.02 and 241.54 cm) compared to Dejla cultivar (215.57 and 236.26 cm) in the two sites, respectively and perhaps this is due to the genetic variation between cultivars. This is consistent with [6] and [9].

As for the bio stimulant, the 2g/L treatment superiority and recorded the highest (PH) reach (232.41 and 245.20cm) while cont. treat giving the lowest (PH) (215.88 and 233.77 cm) in the two sites, respectively and perhaps this is due to the role of the bio stimulant in the formation of the auxin hormone that works to increase elongation and division cells of the plant [10]. Result is in line with [11].

Table (4) shows the superiority of the interaction of the Furat cultivar with the bio stimulant treatment of 2g/L in (PH), which reached (242.00 and 248.03 cm), while the interaction of the Dejla cultivar with the cont. treat achieved the lowest rate of the trait, which reached (209.99 and 230.92 cm) in the two sites, respectively.

### Number of Plant Leaves (NPL):

Table (3) explained that there is no significant variation between cultivars in (NPL) for two sites. This is in agreement with [12] and [6]. As for the bio stimulant, the 2g/L treatment superiority in this trait and achieved (16.33 and 15.85 leaf/plant) compared to the cont. treat that achieved the lowest rate for the trait (15.33 and 15.14 leaf/plant). This due to that bio stimulant is a factor Mainly in increasing the vegetative growth, which contributed to the increase in (NPL). This is consistent with [13] and [14].

It is noted from Table (4) that the superiority of interaction of Furat cultivar that sprayed with 2 g/L of bio stimulant in (NPL) was (16.42 and 15.99 leaf/plant) compared to the interaction of the Dejla cultivar with the cont. treat that gaved the lowest rate of(NPL) (15.18 and 15.01 leaf/plant).

### **Leaf Area (cm<sup>2</sup>) (LA):**

Table (3) shows that the cultivar Furat achieved the highest significant average of (LA) (5214.54 and 5869.52 cm<sup>2</sup>) compared to the cultivar Dejlja (5142.99 and 5771.01 cm<sup>2</sup>) in the two sites, respectively. This may be attributed to the genetic factor that caused the variation Cultivars in trait and their response to environmental conditions. This is in agreement with [15] and [6]. It was also found that spraying 2g/L of fertilizer achieved a significant increase in (LA) that achieved (5465.47 and 5947.12 cm<sup>2</sup>) compared to the cont. treat (4848.58 and 5730.85 cm<sup>2</sup>) in the two sites, respectively. This due to increase in leaves number (Table3). This is consistent with [11].

Table (4) explained the superiority of interaction the Furat cultivar with 2 g / liter of bio stimulant achieved the highest (LA) of (5475.27 and 6000.46 cm<sup>2</sup>) compared to the interaction of the cultivar Dejlja with the cont. treat (7496.86 and 5667.00 cm<sup>2</sup>) in the two sites, respectively.

### **Ear Weight (g)(EW):**

Table (3) shows a significant increase in (EW) of Furat cultivar (206.17 and 216.37 cm<sup>2</sup>), while the lowest (EW) was in Dejlja cultivar (193.35 and 210.19 g) in the two sites, respectively. The superiority of the Furat cultivar is due to the increase in chlorophyll content and leaf area (Table 3), which improved the process of photosynthesis and increased the accumulation of its products in the plant, including ear. This is in line with [16] and [17]. The increase in bio stimulant levels led to an increase in (EW), as 2g/L giving the high significant mean (214.13 and 232.48g), while the cont. treat achieved the lowest average for the trait (185.00 and 186.00g) in the two sites, respectively, due to the fact that the bio stimulant increased the pigment Chlorophyll, cell division and expansion, as well as increased photosynthesis efficiency as a result of increased chlorophyll content and leaf area (Table 3) and thus increased ear weight. This is consistent with [8] and [18].

Table (4) shows that the interaction of the Furat cultivar with the level of 2 g/L was superior, as it reached (220.58 and 235.68 g) compared to the Dejlja cultivar with the cont. treat, as it reached (180.51 and 178.56 g) in the two sites, respectively.

### **500 Grains Weight (g) (500 Grain W) :**

Table (3) shows the significant superiority of Furat cultivar in (500 Grain W), giving it (173.00 and 148.70 grams) compared to Dejlja cultivar, giving it (168.77 and 145.82 grams) in the two sites, respectively. This is due to the superiority of the Furat cultivar in Chlorophyll content and leaf area (Table 3), which contributed to the increase in dry matter weight. This is consistent with [19] and [20].500 grains weight was affected by the different levels of bio stimulant, as level 2g/L achieved the highest rate for the trait (176.73 and 154.19gm), while the cont. treat achieved (166.00 and 139.07gm) in the two sites, respectively. The increase in grain weight was a result bio stimulant in delaying aging as a result of increase chlorophyll content and leaf area (Table 3), as well as prolonging the effective period required for grain saturation and thus increasing the accumulation of dry matter. This is in line with [4] and [11].

Table (4) indicates the significant superiority of the interaction of Furat cultivar with the treatment of 2g/L of fertilizer, as it reached (178.80 and 154.74gm) compared to the interaction of the Dejlja cultivar with the cont. treat, as it reached (164.51 and 136.69gm) in the two sites, respectively.

### **Ear Grains Number (EGN):**

Table (3) shows that the Furat cultivar was significantly superior by recording t (471.48 and 579.90 grain/ear) compared to the Dejlja cultivar (464.13 and 525.37 grain/ear) in both sites, respectively. This may be attributed to the ability of the cultivar Furat to form a larger number of grains compared to the Dejlja cultivar. This is in line with [19] and [5]. Fertilizer level exceeded 2g/L by achieving the highest rate for the trait (502.23 and 583.78 grain/ear) compared to the cont. treat that achieved (437.42 and 521.81 grain/ear). This is

due to bio stimulant in increase vegetative total and increase the fertility rate on producing a larger number of grains. This is consistent with [19] and [13].

Table (4) shows that the interaction of the Furat cultivar with the level of 2 g / L was significantly superior in (EGN) (511.55 and 612.86 grain / ear), while the interaction of the Furat cultivar with the cont. treat achieved the lowest (EGN) (435.44 grain / ear) in the Zakho site and the cultivar overlapped Dejla with cont. treat (496.44 grain/ear) at Sumel site.

**Grain Yield (tons/ha)(GY):**

Table (3) indicates a significant increase of Furat cultivar in (GY), as it achieved (8.14 and 8.63 tons/ha) compared to Dejla cultivar, which achieved (7.81 and 7.65 tons/ha) in the two sites, respectively. This may be due to The

increase in the Furat cultivar indicates an increase in leaf area, 500 grains weight and ear grains number (Table 3). This is consistent with [5] and [9]. The increase in the bio stimulant levels had a gradual and significant increase in this trait, as the level of 2g/L achieved the highest significant average for (GY) (9.47 and 9.65 ton/ha) as compared to the cont. treat (6.97 and 6.98 ton/ha) in the two sites, respectively. This increase is due to the superiority in 500 grains weight and ear grains number (Table 3). This is consistent with [4] and [11].

Table (4) showed that the interaction of the Furat cultivar with the 2g/L treatment was significantly higher, reaching (9.76 and 10.22 ton/ha) compared to the interaction of Dejla cultivar with the cont. treat, which achieved (6.94 and 6.61 ton/ha) in two sites, respectively.

Table (3) : Effect of Cultivars and Bio- Stimulant fertilizer on corn at the studied traits for both sites (Zakho and Sumel).

Factors	Traits							
	CCI	PH	NPL	LA	EW	500 GW	EGN	GY
Zakho site								
Cultivars								
Furat	44.88 a	232.02 a	15.88 a	5214.54 a	206.17 a	173.00 a	471.48 a	8.14 a
Dejla	41.35 b	215.57 b	15.70 a	5142.99 b	193.35 b	168.77 b	464.13 b	7.81 b
Bio- Stimulant g/L								
0	40.11 b	215.88 c	15.33 c	4848.58 d	185.00 c	166.00 b	437.42 d	6.97 d
1	42.77 ab	221.51 bc	15.61 bc	5080.02 c	196.16 b	167.81 b	451.28 c	7.34 c
1.5	44.06 a	225.39 ab	15.88 b	5321.00 b	203.76 ab	173.00 a	480.29 b	8.13 b
2	45.53 a	232.41 a	16.33 a	5465.47 a	214.13 a	176.73 a	502.23 a	9.47 a
Sumel site								
Cultivars								
Furat	50.88 a	241.54 a	15.58 a	5869.52 a	216.37 a	148.70 a	579.90 a	8.63 a
Dejla	48.22 b	236.26 b	15.36 a	5771.01 b	210.14 b	145.82 b	525.37 b	7.65 b
Bio- Stimulant g/L								
0	46.35 c	233.77 c	15.14 c	5730.85 b	186.00 d	139.07 d	521.81 b	6.98 d
1	48.55 bc	236.26 bc	15.35 bc	5775.77 b	213.34 c	145.44 c	538.80 c	7.59 c
1.5	50.34 b	240.37 ab	15.54 ab	5827.32 b	221.22 b	150.33 b	566.14 b	8.32 b
2	52.96 a	245.20 a	15.85 a	5947.12 a	232.48 a	154.19 a	583.78 a	9.65 a

Values with different letters are significantly in each column (p<0.05).

Table (4) : Effect of interaction between Cultivars and Bio- Stimulant on corn at the studied traits for both sites(Zakho and Sumel).

Factors		Traits							
Cultivars	Bio-Stimulant g/L	CCI	PH	NPL	LA	EW	500 G W	EGN	GY
Zakho site									
Furat	0	41.86 bc	221.76 cde	15.49 cd	4900.30 de	189.50 De	167.48 cd	435.44 e	7.00 e
	1	44.71 ab	229.87 bc	15.70 c	5150.60 c	202.71 Bcd	170.25 bcd	455.26 d	7.52 d
	1.5	45.33 ab	234.44 ab	15.92 abc	5332.00 b	211.89 Ab	175.45 ab	483.67 bc	8.29 c
	2	47.62 a	242.00 a	16.42 a	5475.27 a	220.58 a	178.80 a	511.55 a	9.76 a
Dejla	0	38.36 c	209.99 e	15.18 d	4796.86 e	180.51 e	164.51 d	439.40 e	6.94 e
	1	40.83 bc	213.15 ed	15.51 cd	5009.43 d	189.60 de	165.36 d	447.29 de	7.16 de
	1.5	42.78 bc	216.33 de	15.84 bc	5310.00 b	195.63 cde	170.54 bcd	476.92 c	7.96 c
	2	43.44 ab	222.81 bcd	16.26 ab	5455.67 a	207.68 abc	174.66 abc	492.91 b	9.18 b
Sumel site									
Furat	0	47.76 cd	236.62 bc	15.26 bc	5794.69 bcd	193.43 e	141.45 e	547.18 d	7.45 de
	1	49.44 bc	238.33 bc	15.41 bc	5820.11 bc	213.39 d	147.40 cd	565.83 c	8.07 c
	1.5	52.57 ab	243.18 ab	15.67 ab	5862.80 abc	223.00 bc	151.20 abc	593.73 b	8.77 b
	2	53.76 a	248.03 a	15.99 a	6000.46 a	235.68 a	154.74 a	612.86 a	10.22 a
Dejla	0	44.93 d	230.92 c	15.01 c	5667.00 d	178.56 f	136.69 f	496.44 e	6.61 f
	1	47.67 cd	234.18 c	15.30 bc	5731.43 cd	213.29 d	143.48 de	511.77 e	7.11 e
	1.5	48.11 cd	237.55 bc	15.41 bc	5791.84 bcd	219.43 cd	149.45 bc	538.55 d	7.87 cd
	2	52.16 ab	242.37 ab	15.71 ab	5893.79 ab	229.27 ab	153.64 ab	554.70 cd	9.09 b

Values with different letters are significantly in each column (p<0.05).

### Conclusions

The high level of bio stimulant (2g/L) achieved the highest rates in all traits (CCI, PH, NPL, LA, EW, 500 GW, EGN and GY), and the

cultivar Furat recorded the highest rates in most of the traits (CCI, PH, LA, EW, 500 GW, EGN and GY).

## References

- [1] FAO , 2021. World Food and Agriculture - Statistical Yearbook 2021. Rome. pp: 365. <https://www.fao.org/3/cb4477en/cb4477en.pdf>
- [2] Chaudhary P., Singh S., Chaudhary A., Sharma A. and Kumar G. ,2022. Overview of biofertilizers in crop production and stress management for sustainable agriculture. *Front. Plant Sci.* 13:930340. doi: 10.3389/fpls.2022.930340.
- [3] Abd-Elwahab, M.A., Gaballah, A.B., Mansour, A.A. and Abo-ELkhair, N.A. ,2018. The effect of maize (*Zea mays* L.) hybrids, nitrogen source and bio-fertilizer levels on yield and its components and yield analysis under mid delta region conditions. *J. Product. Dev.*, 23(2): 215- 234.
- [4] Farajzadeh, E.M.T. and Babashpour, M.A. ,2021. Bio-fertilizer impact on production efficiency and yield of corn (*Zea mays*) cultivars under water deficiency. *Agri.Tech.*, 41 (1), 85-94. DOI: <http://doi.org/10.22146/agritech.58541>
- [5] Ahmed, F.R., Mohammed, N.J., Mohammed, A.K. and Yahya, S.A. ,2023. Effect of plant density and levels of nitrogen fertilizer on the growth and yield of two cultivars of corn (*Zea mays* L.). *Int. J. Agricult. Stat. Sci.*, 19(1): 123-132. DOI: <https://doi.org/10.59467/IJASS.2023.19.123>.
- [6] Zaki, S.M. and Ahmed, R.F., 2023. Effect of foliar spraying with nano composite fertilizers and organic fertilizer (Optimus Plus) on growth traits varieties of corn. *Euphrates J. Agric. Sci.*, 15 (1): 250-263.
- [7] Hasham ,N.S., Kareem, K.A., Al-Abassi, A.A.A.K. and Kahle, A.S., 2023. Effect of planting season and variety in some growth characters of corn. *IOP Conf. Ser.: Earth Environ. Sci.*, 1213 (2023) 012041. doi:10.1088/1755-1315/1213/1/012041
- [8] Abo-Marzoka, E.A., El-Mantawy, R.F.Y. and Soltan, I.M., 2017. Response of maize to mineral nitrogen and bio- fertilization. *Egypt.J.Agron.* 39(1): 19-26. DOI :10.21608/agro.2017.427.1046
- [9] Kbibow, I.N.A., Khalil, N.A., Ashram, M.J. and Mkhies, S.W., 2023. Effect of the nitrogen fertilizer type on the growth and productivity of two cultivars of maize grown in calcareous soil. *Arab. J. Sci. Res.*, 1(4) : 1-8. <https://doi.org/10.5339/ajsr.2023.4>
- [10] Taiz, L. and Zeiger, E., 2002. *Plant Physiology*. Publisher. Sinauer Associates. Third Edition. PP:690.
- [11] Jumaah, M.A. and Al-Joboory, W.A., 2022. The difference in the effect of fertilizer combinations on the growth and yield indicators of maize *Zea mays* L. *Anbar J. Agric. Sci.*, 20(1): 138-148. DOI -Crossref: 10.32649/ajas.2022.175653
- [12] Muchdar, E.A., Numba, S. and Takdir, A., 2021. Growth and production evaluation of corn varieties and genotypes grow from seed with different storage ages. *IOP Conf. Ser.: Earth Environ. Sci.*, 911 (2021) 012067. doi:10.1088/1755-1315/911/1/012067
- [13] Singh, S., Singh, H., Kumar, P., Singh, V., Kumar, S. and Singh, R., 2021. Effect of NPK levels with bio-fertilizers on productivity of maize (*Zea mays* L.). *Int. J. Chem. Stud.*, 9(1): 1476-1479. DOI: <https://doi.org/10.22271/chemi.2021.v9.i1u.11431>
- [14] Jauhari, S.S., Nurlaily, R., Arianti, F.D. and Minarsih, S., 2022. Effect of adding bio-phosphate fertilizer on balanced fertilization on maize productivity in intensive land. *IOP Conf. Ser.: Earth Environ. Sci.*, 1107 (2022) 012010 doi:10.1088/1755-1315/1107/1/012010
- [15] Orebo, D., Shanka, D. and Hadaro, M., 2021. Maize (*Zea mays* L.) yield response to the effect of blended fertilizer and varieties under supplemental irrigation at Hadero Zuria Kebele, Southern Ethiopia. *Heliyon*, 7: 1-9. <https://doi.org/10.1016/j.heliyon.2021.e07697>
- [16] Khan, W., Sagar, A., Madhu, M. and Sekhar, M., 2020. Performance of sweet corn (*Zea mays* L. saccharata) varieties under varying phosphorus levels. *Int. J. Curr. Microbiol. App. Sci.*, 9(9): 1455-1461. <https://doi.org/10.20546/ijcmas.2020.909.185>
- [17] Subaedah, S., Edy, E. and Mariana, K., 2021. Growth, yield, and sugar content of different varieties of sweet corn and harvest time. *Int. J. Agron.*, Volume 2021, Article ID 8882140, 1-7. <https://doi.org/10.1155/2021/8882140>
- [18] Rajesh, B., Mehera, B. and Kumar, P., 2023. Effect of bio-fertilizer and gibberellic acid on growth and yield of baby corn (*Zea mays*, poaceae). *Int. J. Environ. Clim. Chang.*, 13 (7): 602-607. DOI: 10.9734/IJECC/2023/v13i71912
- [19] Alafeea, R.A.A., Alamery, A.A. and Kalaf, I.T., 2019. Effect of bio fertilizers on increasing the efficiency of using chemical fertilizers on the yield component of maize (*Zea mays* L.). *Plant Arch.*, 19, Supplement 2: 303-306.
- [20] Bawa, A., 2021. Yield and growth response of maize (*Zea mays* L.) to varietal and nitrogen application in the guinea savanna agro-ecology of ghana. *Adv. Agric.*, Volume 2021, Article ID 1765251, 8 pages. <https://doi.org/10.1155/2021/1765251>.



## استجابة نمو وحاصل صنفين من الذرة الصفراء (*Zea mays L.*) للرش بالمحفز

### Disper chlorophyll GS الحيوي الكلوروفيلي

فتحي عبد الكريم عمر<sup>3</sup>  
[fathiemenky@uod.ac](mailto:fathiemenky@uod.ac)

خليل إبراهيم خليل<sup>2</sup>  
[khaleelibk@uomosul.edu.iq](mailto:khaleelibk@uomosul.edu.iq)

ريان فاضل احمد<sup>1</sup>  
[rayanobody79@uomosul.edu.iq](mailto:rayanobody79@uomosul.edu.iq)

<sup>2,1</sup> قسم المحاصيل الحقلية، كلية الزراعة والغابات، جامعة الموصل، الموصل، العراق  
<sup>3</sup> قسم المحاصيل الحقلية، كلية علوم الهندسة الزراعية، جامعة دهوك، دهوك، العراق.

• تاريخ استلام البحث 15/09/2023 وتاريخ قبوله 03/10/2023

#### المخلص

نفذت التجربة حقلياً في موقعين (زاخو وسيميل) التابعين لمحافظة دهوك/ العراق خلال المدة 18 – 21 تموز 2022، باستخدام تصميم القطاعات العشوائية الكاملة (R.C.B.D) وبثلاثة مكررات، لدراسة صنفين من الذرة الصفراء (فرات ودجلة) وأربعة مستويات من المحفز الحيوي الكلوروفيلي Disper Chlorophyll GS (0 و 1 و 1.5 و 2 غم/لتر). أظهرت النتائج تفوق الصنف فرات على الصنف دجلة في جميع الصفات في كلا الموقعين عدا صفة عدد أوراق النبات، أما بالنسبة للمحفز الحيوي فقد سجل المستوى 2غم/لتر من المحفز الحيوي أعلى معدل في جميع الصفات المدروسة في كلا الموقعين مقارنة ببقية المستويات. وكان تأثير التداخل معنوياً في جميع الصفات في كلا الموقعين، إذ حقق تداخل الصنف لفرات مع المستوى 2غم/لتر من المحفز الحيوي الكلوروفيلي أعلى معدل في حاصل الحبوب (9.76 و 10.22 طن/هـ) في كلا الموقعين على التوالي.

**الكلمات المفتاحية:** الذرة، الحيوية، المنشطات، الكلوروفيل، الأصناف.